Public mainta for red the Off

### AD-A262 120



#### **TION PAGE**

Form Approved OBM No. 0 '04 0189

our per response, including the time for reviewing in tructions, searching existing dilla social media or any other assection for increasing distance of increasing this burde in any other assect of this cultions on force of increasing matter Operations and Reports, 1215 Inflerson Davis Flighway, Suite 1204, Artington, VA 22202 4002, and to Washington, DC 20503.

2)

Mrcn-April 1993

3. Report Type and Dates Covered. Final - Journal Article

Title and Subtitle.     Tactical/Environmental Decision Aids for Naval Strike Warfare	5. Funding Numbers. Contract						
	Program Element No. Project No.	060307N 7 <b>W</b> 0513					
F. Author(s).  J. Michael Sierchio and Sam Brand	Task No. Accession No.	4 DN656775					
	Work Unit No.	94422C					
7. Performing Organization Name(s) and Address(es). Naval Research Laboratory Atmospheric Directorate	8. Performing Orga Report Number.	nization					
Atmospheric Directorate	JA 442:063:92						

9. Sponsoring/Monitoring Agency Name(s) and Address(es),

Space and Naval Warfare Systems Command Washington, DC 20363-5100

Stennis Space Center, MS 39529-5004



10. Sponsoring/Monitoring Agency Report Number.

JA4422:063:92

11. Supplementary Notes.
Published in Naval Aviation News.

12a. Distribution/Availability Statement.

Approved for public release; distribution is unlimited.

12b. Distribution Code.

13. Abstract (Maximum 200 words).

The strike warfare community requires accurate meteorological analyses and forecasts to properly plantand effectively execute tactical operations. This point was vividly illustrated during the Persian Gulf War and documented by the Center for Naval Analyses in its quarterly progress report of April-June 1991: "Analysis of Desert Storm TACAIR operations indicated that unfavorable environmental conditions were responsible for 29 Navy strike mission aborts or cancellations and for 63 strike diversions from the primary target. Moreover, at least one-third of all missions executed by Navy TACAIR were impaired by restricted meteorologic visibility."

98 3 22 035

93-05943

14. Subject Terms. Atmospheric effects, environ	15. Number of Pages. 2		
	,,		16. Price Code.
17. Security Classification of Report.	18. Security Classification of This Page.	19. Security Cinssification of Abstract	20, Limitation of Abstract.
Unclassified	Unclassified	Unclassife d	SAR

## MADAL ADDATION NEWS

Flagship Publication of Naval Aviation

. 12

Oldest U.S. Navy Periodical, Volume 75, No. 3, March-April 1993



SF	PMAGTF	
Te	sts	
66	From the Sea"	

Okinawa Decommissioned		11
Restoring Hope in Somalia		14
Eyes and Ears over Somalia		16
Enlisted Aviation Series – Aviation Structural Mechanic (AMS) .	•	20
At the Merge and Beyond: Fighting and Working Together, Part 1		22
Tactical/Environmental Decision Aids for Naval Strike Warfare		24
Naval Aviation in WW II ~ Guadalcanal: Trial by Fire, Part 2		26
Jammin' Orions Train the Fleet		32

Flight Line													. 1
Grampaw Pettibone .													. 2
Airscoop													. 4
Naval Aircraft: TA/RA .													
People-Planes-Places													33
Professional Reading													
<b>ANA Bimonthly Photo</b>	Cc	n	۱p	el	it	io	n	٠					36
Flight Bag													



FRONT COVER – Artist Morgan Wilbur's painting depicts the following flight from Henderson Field. Guadalcanal, on August 28, 1942: Flying a Douglas SBD Dauntless dive-bomber, Ensign Harold "Hal" Buell, with gunner ARM 3/C John Villarreal, attacked the Japanese destroyer Shirakumo. At dusk, they scored a direct hit on the warship, seriously damaging it and causing a great loss of life to the enemy. The SBD's aircrew then returned safety to their base.

RAdm, Riley D. Mixson

Director, Air Warfare

Published by the Naval Historical Center under the auspices of the Chief of Naval Operations

> Dr. Dean C. Allard Director of Naval History

Cdr. Stephen R. Silverio

Director: Navai Aviation History and Publication Division

#### Staff

LCdr. Richard R. Burgess	Editor
Sandy Russell	Managing Editor
Charles C. Cooney	Art Director
Joan A. Frasher	Associate Editor
JOCS(AW) Theress L. Dunn	Associate Editor
J01(SW) Eric S. Sesit	Assistant Editor

#### Associates

Harold Andrews
Technical Advisor
Cdr. Peter Mersky, USNR
Book Review Editor
Capt. R. Rausa, USNR (Ret.)

Contributing Editor

#### **Publication Policy:**

Naval Aviation News considers for publication unsolicited manuscripts, photolessays, artwork, and general news about aircraft, organizations, history, and/or human endeavors which are the core of Naval Aviation. All military contributors should forward articles about their commands only after internal security review and with the permission of the commanding officer. Manuscripts will be returned upon request. Articles accepted for publication may be submitted on a diskette in Word Perdont 5.

For further guidelines on submissions, contact Managing Editor, Naval Aviation News, at DSN 288-4407/8/9 or (202) 433-4407/8/9, FAX (202) 433-2343

#### Subscription Information:

Naval Aviation News (USPS 323-310 ISSN 0028-1417) is published bimonthly for the Chief of Naval Operations by the Naval Historical Center Editorial offices are located in Building 157-1 Washington Navy Yard Washington, D.C., 20374-5059 Seconciass postage is paid at Washington, D.C., and additional mailing offices. Naval Aviation News is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, phone (202) 783-3238. Annual subscription 57-50

POSTMASTER. Send address changes to Naval Aviation News, GPO Order Desk, Superintendent of Documents, Washington, D.C. 20402. The Secretary of the Navy has determined that this publication is necessary in the transaction of business required by law Funds for printing have been approved by the Navy Publications and Printing Policy Committee.



# Tactical/Environmental Strike

By J. Michael Sierchio and Sam Brand

he strike warfare community requires accurate meteorological analyses and forecasts to properly plan and effectively execute tactical operations. This point was vividly illustrated during the Persian Gulf War and documented by the Center for Navai Analyses in its quarterly progress report of April-June 1991: "Analysis of Desert Storm TACAIR operations indicated that unfavorable environmental conditions were responsible for 29 Navy strike mission aborts or cancellations and for 63 strike diversions from the primary target. Moreover, at least one-third of all missions executed by Navy TACAIR were impaired by restricted meteorologic visibility.

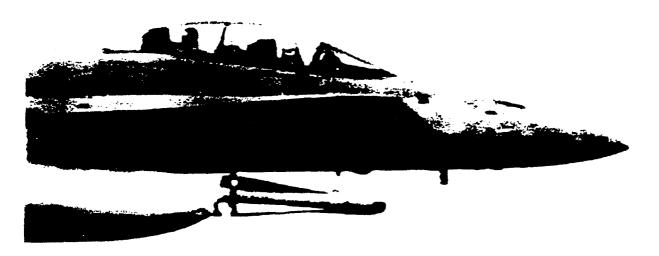
The Air Force Center for Studies and Analyses has examined the expected tactical gain of a land/air strike as a function of improved weather information. This study examined a central European winter tactical air strike scenario with an electrooptical weapons mix. The baseline selected for comparison was the target kill rate for operations for which there was no weather data support. Improvement in tar-

get kill rate was tracked as the level of weather support increased. When limited weather data was available, there was an increase of roughly 22 percent in the target kill rate. When weather data classified as "good" was available, the increase in kill rate was approximately 40 percent. Finally, when the weather forecast provided was "perfect," the increase in target kill rate was 60 percent.

The advent of "smart weapon" technology has resulted in a new arsenal of sensors and weapon systems which are extremely accurate. Unfortunately, as is often the case with sophisticated equipment, this increased accuracy comes at a cost. Not only are these systems expensive, but they are also very sensitive to environmental conditions, such as precipitation. Strike planners must know beforehand if environmental conditions will permit use of such costly systems with a high likelihood of success. Also, aircrews should not be placed at risk carrying a weapon into a hostile zone when environmental conditions would preclude

While meteorological information is important, it is generally more valuable to the tactical decision maker if it is presented in a tactically relevant form. An example of such an environmental tool is the automated electro-optical tactical decision aid (EOTDA) under development at the Naval Research Laboratory, Monterey, Calif. This product was derived from the Mark III EOTDA, which was originally developed at the U.S. Air Force Phillips Laboratory. These EOTDAs (one each for infrared, laser, or television systems) are simply computer programs which process information concerning the target, its background, the weapon system and the environment and produce output in the form of predictions of system detection or lock-on ranges.

The automated EOTDA under development will reside on the third phase of the Tactical Environmental Support System (TESS (3)). TESS is an on-scene workstation with many environmental applications and a data base containing information from a variety of sources, including numerical model output, meteorological



An FA-18D Hornet launches a Maverick missile.

## **Decision Aids for Naval** Warfare

satellite data, and both manual and automated meteorological observation sta-

The Mark III required that all input data be manually entered at some point. This proved extremely labor intensive even if environmental data was available to the user, which it often is not. With the automated EOTDA, the user will input the latitude and longitude of the target, its elevation, and the date and time over target. The EOTDA will access the TESS (3) data base, extracting the environmental data required to make the performance predictions. Keyboard data entry time will be dramatically reduced compared to the Mark III, resulting in more timely delivery of output to the user. This will also allow for the addition of a wide variety of new output products tailored to the needs of various users.

Other applications similar to the EOTDA exist which help planners take into account environmental effects. With increased computing power and improved visualization techniques, output from these products can be combined to com-

plete the "big picture" for planners from an environmental viewpoint. Such products depict the tactical/environmental concerns of a pilot of an attack aircraft armed with infrared precision guided munitions (PGMs) as the aircraft approaches the target. Knowledge of the existence and location of clouds can be used to conceal the aircraft from some threats during its mission.

EOTDA output predicts when the target will first be detected on the aircraft's forward looking infrared display. Enemy surface-to-air missile threat envelopes are of interest for obvious reasons. The aerodynamic envelope and predicted target acquisition and lock-on ranges for the PGMs will tell the pilot when to launch the weapon. The optimum region for successful launch and egress from the target area are displayed. The environment affects all facets of this display, Jernonstrating the importance of providing sound meteorological information to strike mission planners, particularly for a coordinated strike involving tactical aircraft and cruise missiles.

Historically, the meteorological community of the Navy has been support oriented, but that support has been limited to purely environmental data. Over the past decade, there has been a shift in emphasis toward applications of meteorological data - the goal being the creation of products to aid naval commanders in making tactical decisions.

Navy ships, aircraft, sensors, and weapon systems are being tested operationally in a wide range of climatic regions of the world and have proved to be very sensitive to environmental conditions. The challenge to the Navy's environmental community is to understand how the environment affects modern weaponry, and to convey this understanding to commanders in the form of clear, concise, and insightful products.

The authors are research meteorologists at the Naval Research Laboratory. Monterey, Calif. (formerly Atmospheric Directorate, Naval Oceanographic and Atmospheric Research Laboratory)

đ05